



**NASA's University Research Centers:
A *Win-Win* for NASA
....and Minority Institutions**

*Improving Minority Institutions Collaborations
at NASA Workshop*

*Ames Research Center
October 24-25, 2009*

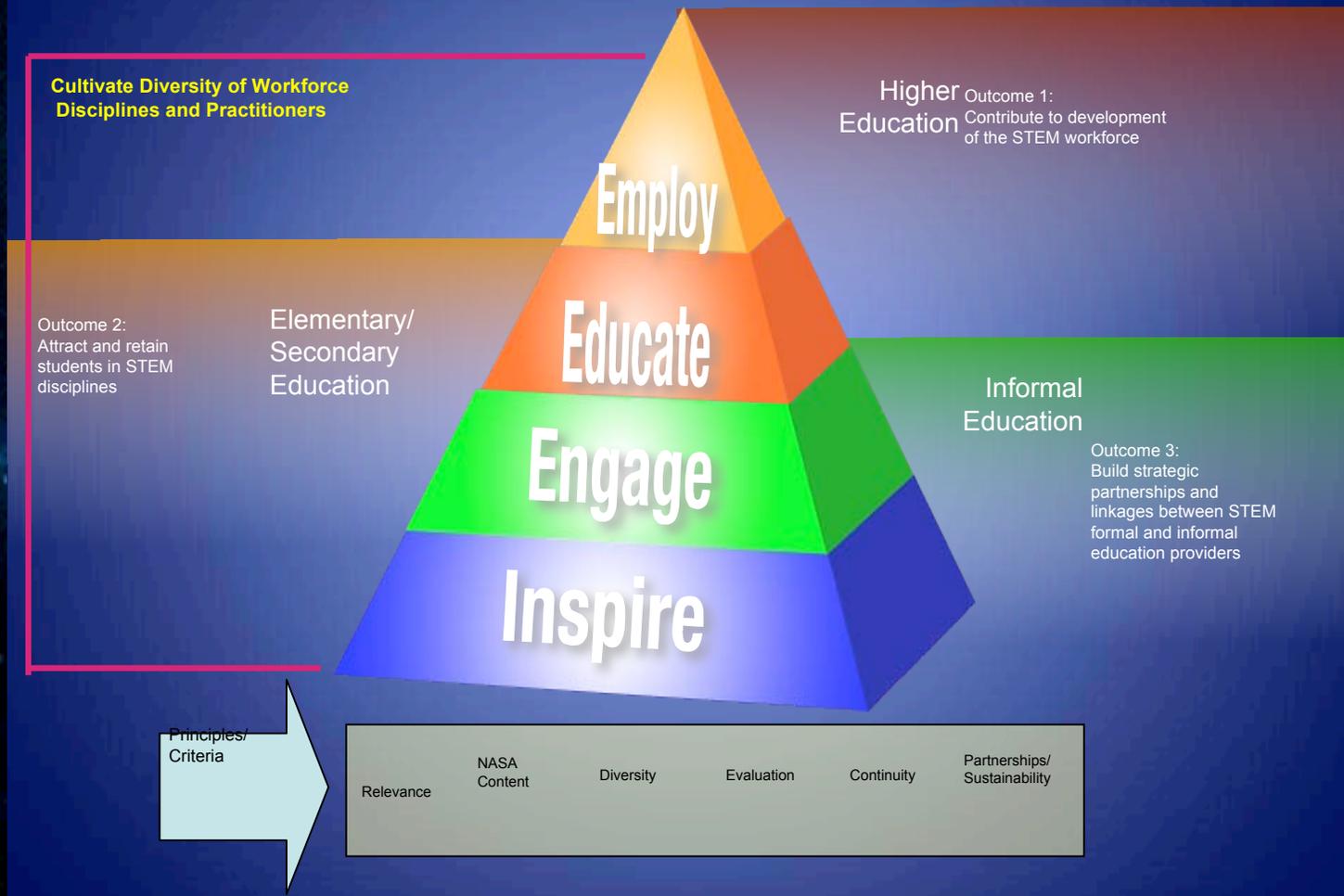
Katrina Emery, URC Project Manager

Presentation Overview



- URC Overview, Goals and Objectives
- Quick Facts
- Funded URC 1991 – 2009
- Current URCs
- A Unique Opportunity
- URC Short Story: **WIN – WIN** for **NASA** and **MI**
- Characteristics of a Successful URC

NASA Education Strategic Framework



The URCs contributes to the achievement of
Outcome 1 (EMPLOY) in the NASA Education Strategic Framework

UNIVERSITY RESEARCH CENTERS

Goals and Objectives



Goal: Continue NASA's commitment of achieving a broad based, competitive aerospace research and technology development capability at Minority Institutions

Objective:

- Establish significant, multi-disciplinary scientific, engineering and/or commercial research centers at host universities that contribute substantially to the programs of one or more of the four NASA mission Directorate described in the NASA Strategic Plan. **(Outcome 1.5 – Targeted Institution Research and Academic Infrastructure)**
- Move increasingly towards gaining support from sources outside the URC project by aggressively pursuing additional funding opportunities offered by the NASA Mission Directorates, industry, and other funding agencies; and **(Outcome 1.1- Faculty and Research Support)**
- Improve the rate at which U.S. citizens, who historically have been underrepresented in NASA-related fields, are awarded undergraduate and graduate degrees at their respective universities in NASA-related fields. **(Outcome 1.2-Student Support)**
- **Target Audience:** Faculty, Undergraduate and Graduate Students at Minority Serving Institutions

Quick Facts on URC



Funding Level:

\$5m Over 5 Years; Funded As A Cooperative Agreement For 5 Years

Eligibility:

- Lead University Must Be A Minority Institution
- Must Offer Graduate Degree In Stem Discipline
- Principal Investigators Must Meet All Of The Following:
 - Be A Tenured Or Tenure-track Faculty Member
 - Have A Doctorate Stem Discipline
- 25% Of Funding Must Support Students

Other Key Information

- 26 Minority Institutions Have Been Funded As URCs Over 18 Years
- URCs Have Significant Institutional Commitment
- Students Are Involved In All Aspects Of The Research. (Minimum 25% Allocation)

Select URC 2006 Accomplishments



- Participants- 596 Undergraduate & Graduate Students
 - 49 B.S. in STEM
 - 45 M.S. in STEM
 - 8 Doctoral in STEM
- Publications
 - Peer Reviewed 126
 - Patents/Copyrights 7 Pending and 1 Granted; 2 Copyrights; 2 Copyright Pending;
- Courses Developed – 8 new STEM Courses; 2 Enhanced in STEM;
- Leverage Funding (Other Gov't and Industry)
 - 98 Proposals Submitted; 35 Funded; Total \$11,175,000

Select URC 2007 Accomplishments*



- Participants- 512 Undergraduate & Graduate Students
 - 52 B.S. in STEM
 - 39 M.S. in STEM
 - 11 Doctoral in STEM
- Publications 257
 - Peer Reviewed: 209
 - Patents: 9 Pending
 - Copyrights: 7 Copyright Pending and 2 received
- Courses Developed – 4 new STEM Courses;
2 Enhanced in STEM;
- Leverage Funding (Other Gov't and Industry)
 - 82 Proposals Submitted; 41 Funded; Total \$26,573,174

SELECT URC FY 09 ACCOMPLISHMENTS (FY 08 DATA)



Total participants	282
<i># underrepresented / underserved students</i>	216
<i># of males</i>	128
<i># of females</i>	154
Curriculum Development	
<i>New or revised courses developed</i>	23

SELECT URC FY 09 ACCOMPLISHMENTS (FY 08 DATA)



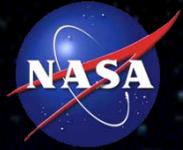
URC Student Workforce Pool	76
NASA, AERO, STEM ACAD, Other ED, STEM Industry	63%
<i>% to NASA</i>	6.5%
<i>% to AERO</i>	19.73%
<i>% to STEM Academic</i>	14.4 %
<i>% to Other STEM</i>	0%
<i>% to STEM Industry</i>	22.3%

NASA UNIVERSITY RESEARCH CENTERS
GROUPS 1 – 5 FY 1991 – 2009

		FY 91 Group 1 *	FY 95 Group 2 *	FY 02 Group 3	FY 08 Group 4	FY 09 Group 5
Alabama Agricultural and Mechanical University	Center for Hydrology, Soil Climatology, and Remote Sensing (HSCARS)		*			
California State University, Long Beach	Center for Human Factors in Advanced Aeronautics Technologies					*
California State University, Los Angeles	Center for Structures, Propulsion, Aerospace and Control Engineering				*	
City University of New York City College	Center for Optical Sensing and Imaging					
Clark Atlanta University	High Performance Polymers and Composites Center	*				
Delaware State University	Establishment of a NASA Optical for Applied Research					*
Fisk University	Center for Photonic Materials and Devices	*				
Florida Agricultural and Mechanical University	Center for Nonlinear and Nonequilibrium Aeroscience (CENNAS)	*				
Florida International University	WaterSCAPES: Science of Coupled Aquatic Processes in Ecosystems from Space				*	
Hampton University	Research Center for Optical Physics (G1); Hampton University Aeropropulsion Center (G3)	*		*		
Howard University	Center for the Study of Terrestrial and Extraterrestrial Atmospheres (CSTEA) (G1); Howard University Beltsville Center for Climate System Observation (G4)	*			*	
Morehouse School of Medicine	Space Medicine and Life Sciences Research Center (SMLSRC)		*			
Morgan State University	Center of Advanced Microwave Research and Applications (G3); Center of Excellence in Systems Engineering for Space Exploration Technologies (G4)			*	*	
Norfolk State University	Center for Research and Education in Advanced Materials			*		
North Carolina Agricultural and Technical State University	Center for Aerospace Research (G1); and Center for Aviation Safety (G4)	*				*
North Carolina Central University	Center for Aerospace Device Research and Education					*
Prairie View A & M University	Center for Applied Radiation Research(G2); Center for Radiation Engineering and Science for Space Exploration(G4)		*		*	
Southern University and A&M College at Baton Rouge	The Center for Coastal Zone Assessment and Remote Sensing			*		
Tennessee State University	Center for Automated Space Science (CASS)		*			
Texas Southern University	The NASA Research Center for Biotechnology and Environmental Health (G3), Center for Bio-Nanotechnology and Environmental Research (G4)			*	*	
Tuskegee University	Center for Food and Environmental Systems for Human Exploration of Space	*		*		
University of New Mexico-Albuquerque	Center for Intelligence Systems Engineering		*			
University of Puerto Rico Mayaguez Campus	Tropical Center for Earth and Space Studies		*			
University of Puerto Rico Rio Piedras Campus	Center for Advanced Nanoscale Materials			*	*	
University of Texas at Brownsville	Center for Gravitational Wave Astronomy			*		*
University of Texas at El Paso	Pan American Center for Earth and Environmental Studies(G2), Center for Space Exploration Technology Research (G5)		*			*

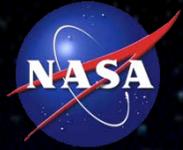


13 Current NASA University Research Centers



- ❖ **California State University, Long Beach (Group 5)**
 - The Center for Human Factors in Advanced Aeronautics Technologies (CHAAT)
- ❖ **California State University Los Angeles (Group 4)**
 - NASA URC SPACE Center
- ❖ **Delaware State University (Group 5)**
 - Establishment of a NASA Optical Sciences Center for Applied Research (OSCAR)
- ❖ **Florida International University (Group 5)**
 - WaterSCAPES: Science of Coupled Aquatic Processes in Ecosystems from Space
- ❖ **Howard University (Group 4)**
 - Howard University Beltsville Center for Climate System Observation
- ❖ **Morgan State University (Group 4)**
 - Center of Excellence in Systems Engineering for Space Exploration Technologies
- ❖ **North Carolina Agricultural and Technical State University (Group 5)**
 - Center for Aviation Safety (CAS)
- ❖ **North Carolina Central University (Group 5)**
 - NASA Center for Aerospace Device Research and Education
- ❖ **Prairie View A & M University (Group 4)**
 - The Center for Radiation Engineering and Science for Space Exploration (CRESSE)
- ❖ **Texas Southern University (Group 4)**
 - Center for Bio-Nanotechnology and Environmental Research (C-BER)
- ❖ **University of Puerto Rico, Rio Piedras (Group 4)**
 - Center for Advanced Nanoscale Materials
- ❖ **University of Texas at Brownsville (Group 4)**
 - Center for Gravitational Wave Astronomy (CGWA)
- ❖ **University of Texas at El Paso (Group 5)**
 - Center for Space Exploration Technology Research (cSETR)

ISS -URC MICROBIAL 1



Space Life Sciences Research Opportunity on STS-129 in Support of K-20 Education

- The URC has a unique opportunity in partnership thanks to NASA Ames Research Center and BioServe Space Technologies to use space life science research as a teaching tool in the K-20 population.
- Texas Southern University will conduct life science research on board the ULF3 mission (STS-129) which is scheduled to launch November 16, 2009.
 - Students, who would not normally have this level of exposure to the space program, can experience the process from beginning (pre-mission activities) to the end (post-mission activities).
- Inspiring and educating the next generation of scientists, technologists, engineers and mathematicians.

URC Short Story: WIN – WIN for NASA and MI



- **Howard University** – est. 1992 as one of the original URCs awarded nationally;
 - 4 areas of research -- Remote Sensing, Atmospheric Chemistry, Sensors and Detectors; 1995 URC narrowed focus to atmosphere science and established partnership with Lab of Atmospheres
- 1997 URC and Lab of Atmosphere's partnership led to *establishment of interdisciplinary graduate MS and PhD program – Howard University Program in Atmospheric Sciences (HUPAS)*
- 2001 Howard successfully competed for NOAA Center for Atmospheric Sciences (NCAS)
- 2008 GSFC and Howard collaboration successfully competed for new URC – 2008-2013

URC Short Story: WIN – WIN for NASA and MI

NASA/GSFC Involvement in HUPAS



▪ HUPAS Adjuncts

1997 ~ 2005 NASA ~3 Scientists (610) held adjunct faculty appointments in a HUPAS home departments, and taught ~ 1 course per semester

▪ Courses regularly taught by adjuncts

Atmospheric Physics; Atmospheric Chemistry, Geophysical Fluid Dynamics, Cloud Physics, Current Topics, Atmospheric Radiation

Several other NASA scientists have taught HUPAS courses without adjunct appointment

Other Contributions

• NASA scientists serve on dissertation committees, comprehensive exam committees, as research advisors, and summer intern mentors

URC Short Story: WIN – WIN for NASA and MI



Specific example of contribution to HUPAS by a Goddard civil servant – Dr. Belay Demoz

1. Designed/initiated and taught a cloud physics and instrumentation course.
2. Coordinated several proposals that were submitted through ROSES and have formed the basis of the WAVES series of experiments at Beltsville.
3. Help developed the MOU and later the Space Act Agreement between GSFC and HU.
4. Co-wrote the wind lidar proposal for Beltsville operation
5. Gave seminars about NASA/research at HU and other places.
6. Now faculty at Howard

URC Short Story: WIN – WIN for NASA

CSTEA/HUPAS Student Production in General and for GSFC Workforce and MI



34 PhD Degrees (Physics, Chemistry, Engineering, HUPAS)

- 4 in HUPAS
- 2 NASA Civil Servants
- 8 dissertations in areas of interest to Laboratory for Atmospheres
- 3 NASA Post Doc (NPP)
- 7 working in atmospheric science areas of interest to NASA

37 MS Degrees—

- 8 MS degrees in HUPAS



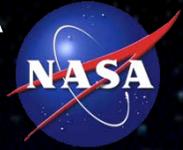
URC Short Story: WIN – WIN for NASA

NASA/GSFC **and MI** Contribution to Beltsville



- Established focus on Raman Lidar
- Provided support in design and development of the Howard Raman Lidar (HURL)
- Helped to successfully compete for AURA Cal/Val in ROSES

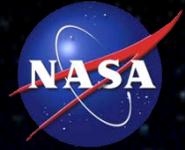
URC Short Story: WIN – WIN for NASA and MI



NASA/GSFC Contribution to Beltsville

- Collaborated to successfully compete for new URC – 2008-2013
 - Development of a GPM ground validation site at HUBC to study precipitation processes for GPM Cal/Val
 - Expansion of current observations of aerosol properties for new sensors like the ASP on the GLORY mission that are designed to investigate the impact of aerosol on climate
 - Deployment of the GSFC Lidar Observatory for Wind (GLOW) at Beltsville for continued proof of concept studies in preparation for a NASA/SMD space-based wind Lidar mission
 - Establishes a basis of broader interdisciplinary collaboration

Goddard Space Flight Center Howard University Fellowship in Atmospheric Science (GoHFAS)



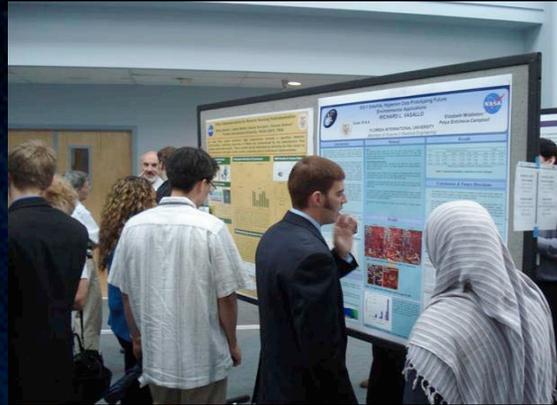
- Scholarships for undergraduates to gain research experience at Goddard or Howard during the summer
- Also supports students to continue research at their home institution during the academic year
- 18 Goddard civil servants have served as GoHFAS mentors
- 60% of GoHFAS students have attended or completed graduate school

CHARACTERISTICS OF A SUCCESSFUL URC



- CLEAR STRATEGIC RESEARCH VISION
- ALIGNED WITH **NASA** TECHNICAL RESEARCH AREAS OF INTEREST
- HUMAN CAPITAL DEVELOPMENT IN STEM AREAS
- INNOVATIVE PARTNERSHIPS
- PLAN FOR SUSTAINABILITY

WIN – WIN for NASA and MIs



Questions??

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